

IRF の設定

実習内容と目標

このラボでは以下のことを学びます：

- IRF の基本的なコンフィギュレーションを習得します。
- IRF での障害の状況と復旧の状況を習得します。
- IRF のケーブル全てに障害が発生した場合の IP アドレスの重複を防ぐための MAD 機能を習得します。

ネットワーク図

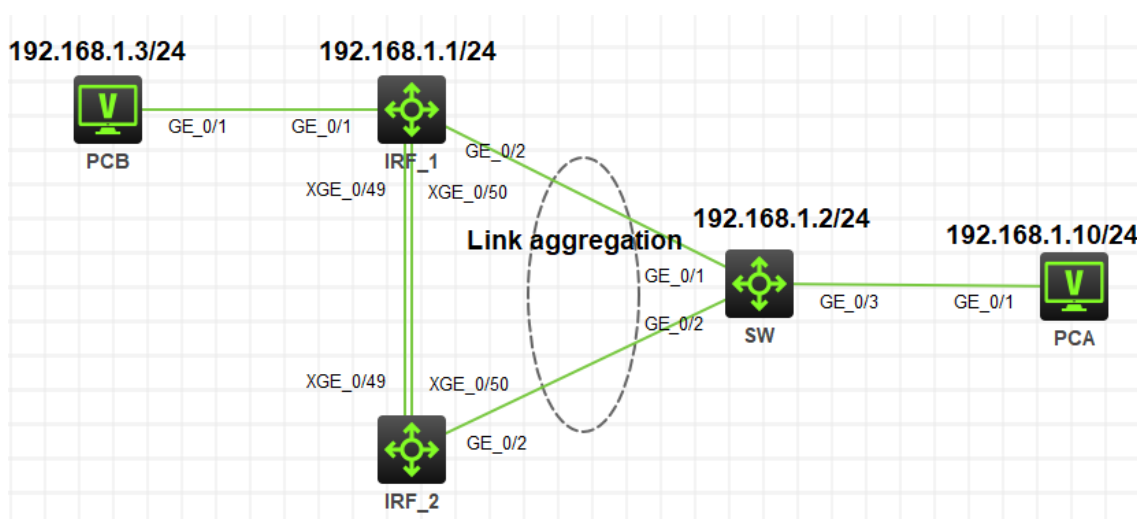


図 1.1 実習ネットワーク

上の図は、テストポロジを示しています。2 つの S5820V2 (IRF_1 と IRF_2)、1 つの S5820V2 (SW)、および 2 つの PC (PCA、PCB) です。

IRF_1 と IRF_2 で IRF の設定を行います。IRF と SW の間は link aggregation を設定し経路の冗長化を実現しています。

実習装置

本実験に必要な主な設備機材 実習装置名前とモデル番号	バージョン	数量	特記事項
S5820V2	Version7.1	3	スイッチ
PC	Windows 7	2	ホスト

ネットワークケーブルの接続	-	4	ストレートケーブル
IRF ポートをつなぐファイバーケーブル	-	2	-

実習手順

タスク 1: 基本的な IRF の設定をする

このテストでは、2 台のスイッチ (IRF_1 と IRF_2) に IRF の設定を行います。

手順 1: テスト構成

以下の表 1-1 はテストで使われる装置のインターフェース、IP アドレスを示しています。

表 1-1 IP アドレス割り当てスキーマ

装置	インターフェース	IP アドレス	補足
IRF_1	G1/0/1		-
	G1/0/2	Link aggregation を設定	-
	XGE1/0/49	IRF を設定	
	XGE1/0/50		
IRF_2	G2/0/2	Link aggregation を設定	-
	XGE2/0/49	IRF を設定	-
	XGE2/0/50		-
SW	G0/1	VLAN 1 192.168.1.2/24	Link aggregation を設 定
	G0/2		
	G0/3		
PCA		192.168.1.10/24	-
PCB		192.168.1.3/24	-

手順 2: IRF_1 の設定を行います。

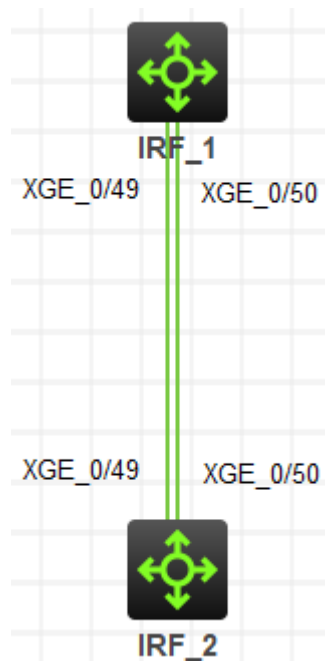


図 1.2 実習ネットワーク

共通の設定

```
<H3C>sys
```

System View: return to User View with Ctrl+Z.

```
[IRF]sysname IRF
```

```
[IRF]irf auto-update enable
```

IRF ポートを shutdown して、STP を disable にします。

```
[IRF]interface Ten-GigabitEthernet 1/0/49
```

```
[IRF-Ten-GigabitEthernet1/0/49]shutdown
```

```
[IRF-Ten-GigabitEthernet1/0/49]undo stp enable
```

```
[IRF-Ten-GigabitEthernet1/0/49]quit
```

```
[IRF]interface Ten-GigabitEthernet 1/0/50
```

```
[IRF-Ten-GigabitEthernet1/0/50]shutdown
```

```
[IRF-Ten-GigabitEthernet1/0/50]undo stp enable
```

```
[IRF-Ten-GigabitEthernet1/0/50]quit
```

IRF の論理スロット/論理ポート 1/1 を作成し、ポート Ten-GigabitEthernet1/0/49 と Ten-GigabitEthernet1/0/50 を IRF 論理スロット/論理ポート 1/1 に追加します。

```
[IRF]irf-port 1/1
```

```
[IRF-irf-port1/1]port group interface Ten-GigabitEthernet 1/0/49
```

You must perform the following tasks for a successful IRF setup:

Save the configuration after completing IRF configuration.

Execute the "irf-port-configuration active" command to activate the IRF ports.

```
[IRF-irf-port1/1]port group interface Ten-GigabitEthernet 1/0/50
```

```
[IRF-irf-port1/1]quit
```

IRF_1 をプライマリデバイスとして選択されるように、IRF_1 の IRF プライオリティを 32 にします。

```
[IRF]irf domain 11
```

```
riority 32
```

IRF に設定したポートを enable にします (IRF_2 との結線はまだ行いません)

```
[IRF]interface Ten-GigabitEthernet 1/0/49
```

```
[IRF-Ten-GigabitEthernet1/0/49]undo shutdown
```

```
[IRF-Ten-GigabitEthernet1/0/49]quit
```

```
[IRF]interface Ten-GigabitEthernet 1/0/50
```

```
[IRF-Ten-GigabitEthernet1/0/50]undo shutdown
```

```
[IRF-Ten-GigabitEthernet1/0/50]quit
```

```
[IRF]irf-port-configuration active
```

```
[IRF]save force
```

Validating file. Please wait...

Saved the current configuration to mainboard device successfully.

IRF の設定を確認します。

IRF のプライオリティが 32 であることが確認できます。

```
[IRF]display irf
```

MemberID	Role	Priority	CPU-Mac	Description
*+1	Master	32	8459-1858-0104	-----

* indicates the device is the master.

+ indicates the device through which the user logs in.

The bridge MAC of the IRF is: 8459-1858-0100

Auto upgrade : yes

Mac persistent : 6 min

Domain ID : 11

IRF に使われるポートとして Ten-GigabitEthernet1/0/49 と Ten-GigabitEthernet1/0/50 が設定されていることが確認できます。

```
[IRF]display irf link
```

```
Member 1
```

IRF Port	Interface	Status
----------	-----------	--------

```

1      Ten-GigabitEthernet1/0/49      DOWN
      Ten-GigabitEthernet1/0/50      DOWN
2      disable                          --

```

手順 3: SW(IRF_2)のスロット番号を 2 に設定します。

```

#論理スロット番号を 2 にします
<H3C>sys
System View: return to User View with Ctrl+Z.
[H3C]sysname IRF
[IRF]irf domain 11
[IRF]irf member 1 renumber 2
Renumbering the member ID may result in configuration change or loss. Continue?[Y/N]:y
[IRF]save force
Validating file. Please wait...
Saved the current configuration to mainboard device successfully.
[IRF]quit
<IRF>reboot
Start to check configuration with next startup configuration file, please wait.....DONE!
This command will reboot the device. Continue? [Y/N]:y
Now rebooting, please wait...
%Nov 23 17:23:49:144 2021 IRF_2 DEV/5/SYSTEM_REBOOT: System is rebooting now.
Cryptographic Algorithms Known-Answer Tests are running ...
CPU 0 of slot 2 in chassis :
Starting Known-Answer tests in the user space.
Cryptographic Algorithms Known-Answer Tests passed.
Line con1 is available.
# スロット番号が 2 に変更されたことを確認します。
Press ENTER to get started.
<IRF>display irf
MemberID    Role    Priority  CPU-Mac    Description
*+2        Master  1        8459-2a32-0204  -----
* indicates the device is the master.
+ indicates the device through which the user logs in.

The bridge MAC of the IRF is: 8459-2a32-0200
Auto upgrade          : yes

```

Mac persistent : 6 min
Domain ID : 11

手順 4: IRF_2 の設定を行います。

```
# 共通の設定
[IRF]irf auto-update enable
# IRF ポートを shutdown して、STP を disable にします。
[IRF]interface Ten-GigabitEthernet 2/0/49
[IRF-Ten-GigabitEthernet2/0/49]shutdown
[IRF-Ten-GigabitEthernet2/0/49]undo stp enable
[IRF-Ten-GigabitEthernet2/0/49]quit
[IRF]interface Ten-GigabitEthernet 2/0/50
[IRF-Ten-GigabitEthernet2/0/50]shutdown
[IRF-Ten-GigabitEthernet2/0/50]undo stp enable
[IRF-Ten-GigabitEthernet2/0/50]quit
# IRF の論理スロット/論理ポート 2/2 を作成し、ポート Ten-GigabitEthernet2/0/49 と Ten-
GigabitEthernet2/0/50 を IRF 論理スロット/論理ポート 2/2 に追加します。
[IRF]irf-port 2/2
[IRF-irf-port2/2]port group interface Ten-GigabitEthernet 2/0/49
You must perform the following tasks for a successful IRF setup:
Save the configuration after completing IRF configuration.
Execute the "irf-port-configuration active" command to activate the IRF ports.
[IRF-irf-port2/2]port group interface Ten-GigabitEthernet 2/0/50
[IRF-irf-port2/2]quit
# IRF_2 をプライマリデバイスとして選択されるように、IRF_2 の IRF プライオリティを 1(デフォルト)にします。
[IRF]irf member 2 priority 1
# IRF ポートを enable にします。
[IRF]interface Ten-GigabitEthernet 2/0/49
[IRF-Ten-GigabitEthernet2/0/49]undo shutdown
[IRF-Ten-GigabitEthernet2/0/49]quit
[IRF]interface Ten-GigabitEthernet 2/0/50
[IRF-Ten-GigabitEthernet2/0/50]undo shutdown
[IRF-Ten-GigabitEthernet2/0/50]quit
[IRF]irf-port-configuration active
[IRF]save force
```

Validating file. Please wait...

Saved the current configuration to mainboard device successfully.

IRF の設定を確認します。

IRF のプライオリティが 1 であることが確認できます。

[IRF_2]display irf

MemberID	Role	Priority	CPU-Mac	Description
*+2	Master	1	8459-2a32-0204	-----

* indicates the device is the master.

+ indicates the device through which the user logs in.

The bridge MAC of the IRF is: 8459-2a32-0200

Auto upgrade : yes

Mac persistent : 6 min

Domain ID : 11

IRF に使われるポートとして Ten-GigabitEthernet2/0/49 と Ten-GigabitEthernet2/0/50 が設定されていることが確認できます。

[IRF_2]display irf link

Member 2

IRF Port	Interface	Status
1	disable	--
2	Ten-GigabitEthernet2/0/49	DOWN
	Ten-GigabitEthernet2/0/50	DOWN

手順 5: IRF SW 間をケーブルで接続し IRF を確立する

注意: HCL ではケーブルをつないただけでは IRF の確立が始まりません。一旦 IRF_2 のスイッチを stop させ、再度 start させます。ついで IRF_1 のスイッチを stop させ、再度 start させると以下のようなメッセージが表示され、落ち着くと IRF が確立されています。

[IRF]%Nov 23 12:40:28:215 2021 IRF STM/6/STM_LINK_UP: IRF port 2 came up.

%Nov 23 12:40:28:215 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface Ten-GigabitEthernet2/0/49 changed to up.

%Nov 23 12:40:28:216 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the interface Ten-GigabitEthernet2/0/49 changed to up.

%Nov 23 12:40:28:536 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface Ten-GigabitEthernet2/0/50 changed to up.

%Nov 23 12:40:28:537 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the interface Ten-GigabitEthernet2/0/50 changed to up.

%Nov 23 12:40:50:018 2021 IRF DEV/2/BOARD_STATE_FAULT: Board state changed to Fault on slot 1, type is unknown.

%Nov 23 12:40:50:610 2021 IRF HA/5/HA_BATCHBACKUP_STARTED: Batch backup of standby board in slot 1 started.

%Nov 23 12:40:51:476 2021 IRF DEV/5/BOARD_STATE_NORMAL: Board state changed to Normal on slot 1, type is H3C S5820V2-54Q.

%Nov 23 12:40:52:273 2021 IRF IFNET/3/IF_WARN: -Slot=1; The jumboframe of the aggregate interface Bridge-Aggregation1 is not supported on the member port GigabitEthernet1/0/1

%Nov 23 12:40:55:431 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface GigabitEthernet1/0/1 changed to up.

%Nov 23 12:40:55:436 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface Ten-GigabitEthernet1/0/49 changed to up.

%Nov 23 12:40:55:442 2021 IRF LAGG/6/LAGG_ACTIVE: Member port GE1/0/1 of aggregation group BAGG1 changed to the active state.

%Nov 23 12:40:55:443 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the interface Ten-GigabitEthernet1/0/49 changed to up.

%Nov 23 12:40:55:443 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface Ten-GigabitEthernet1/0/50 changed to up.

%Nov 23 12:40:55:448 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the interface Ten-GigabitEthernet1/0/50 changed to up.

%Nov 23 12:40:55:448 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface GigabitEthernet1/0/2 changed to up.

%Nov 23 12:40:55:449 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the interface GigabitEthernet1/0/2 changed to up.

%Nov 23 12:40:55:462 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface Bridge-Aggregation1 changed to up.

%Nov 23 12:40:55:462 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the interface GigabitEthernet1/0/1 changed to up.

%Nov 23 12:40:55:462 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the interface Bridge-Aggregation1 changed to up.

%Nov 23 12:40:55:490 2021 IRF LLDP/6/LLDP_CREATE_NEIGHBOR: Nearest bridge agent neighbor created on port Ten-GigabitEthernet2/0/49 (IfIndex 178), neighbor's chassis ID is 4cf2-7c42-0200, port ID is Ten-GigabitEthernet1/0/49.

%Nov 23 12:40:55:246 2021 IRF LLDP/6/LLDP_CREATE_NEIGHBOR: -Slot=1; Nearest bridge agent neighbor created on port Ten-GigabitEthernet1/0/49 (IfIndex 50), neighbor's chassis ID is 4cf2-7c42-0200, port ID is Ten-GigabitEthernet2/0/49.

%Nov 23 12:40:55:495 2021 IRF LLDP/6/LLDP_CREATE_NEIGHBOR: Nearest bridge agent neighbor created on port Ten-GigabitEthernet2/0/50 (IfIndex 179), neighbor's chassis ID is 4cf2-7c42-0200, port ID is Ten-GigabitEthernet1/0/50.

%Nov 23 12:40:55:297 2021 IRF LLDP/6/LLDP_CREATE_NEIGHBOR: -Slot=1; Nearest bridge agent neighbor created on port Ten-GigabitEthernet1/0/50 (IfIndex 51), neighbor's chassis ID is 4cf2-7c42-0200, port ID is Ten-GigabitEthernet2/0/50.

%Nov 23 12:40:56:654 2021 IRF LLDP/6/LLDP_CREATE_NEIGHBOR: -Slot=1; Nearest bridge agent neighbor created on port GigabitEthernet1/0/2 (IfIndex 3), neighbor's chassis ID is 4cf2-8d1a-0300, port ID is GigabitEthernet1/0/1.

%Nov 23 12:40:56:912 2021 IRF HA/5/HA_BATCHBACKUP_FINISHED: Batch backup of standby board in slot 1 has finished.

%Nov 23 12:41:25:784 2021 IRF STP/6/STP_DETECTED_TC: Instance 0's port Bridge-Aggregation1 detected a topology change.

%Nov 23 12:41:25:736 2021 IRF STP/6/STP_DETECTED_TC: -Slot=1; Instance 0's port GigabitEthernet1/0/2 detected a topology change.

手順 6: IRF の状態確認

```
[IRF]dis irf link
```

```
Member 1
```

IRF Port	Interface	Status
1	Ten-GigabitEthernet1/0/49	UP
	Ten-GigabitEthernet1/0/50	UP
2	disable	--

```
Member 2
```

IRF Port	Interface	Status
1	disable	--
2	Ten-GigabitEthernet2/0/49	UP
	Ten-GigabitEthernet2/0/50	UP

```
[IRF]display irf
```

MemberID	Role	Priority	CPU-Mac	Description
*+1	Master	32	82ed-032d-0604	---
2	Standby 1		4cf2-7c42-0204	---

* indicates the device is the master.

+ indicates the device through which the user logs in.

The bridge MAC of the IRF is: 4cf2-7c42-0200

Auto upgrade : yes

Mac persistent : 6 min

Domain ID : 0

[IRF]display irf topology

Topology Info

	IRF-Port1		IRF-Port2		
MemberID	Link	neighbor	Link	neighbor	Belong To
2	DIS	---	UP	1	82ed-032d-0604
1	UP	2	DIS	---	82ed-032d-0604

手順 7: IRF に管理用の IP アドレスをアサインします

```
[IRF]interface Vlan-interface 1
```

```
[IRF-Vlan-interface1]ip address 192.168.1.1 24
```

```
[IRF-Vlan-interface1]quit
```

```
[IRF]save f
```

Validating file. Please wait...

Saved the current configuration to mainboard device successfully.

Slot 1:

Save next configuration file successfully.

タスク 2: IRF 装置と外部 SW を link aggregation で接続します

このテストでは、IRF のケーブルに障害が発生した時の冗長経路を用意するために外部 SW と link aggregation で接続します。

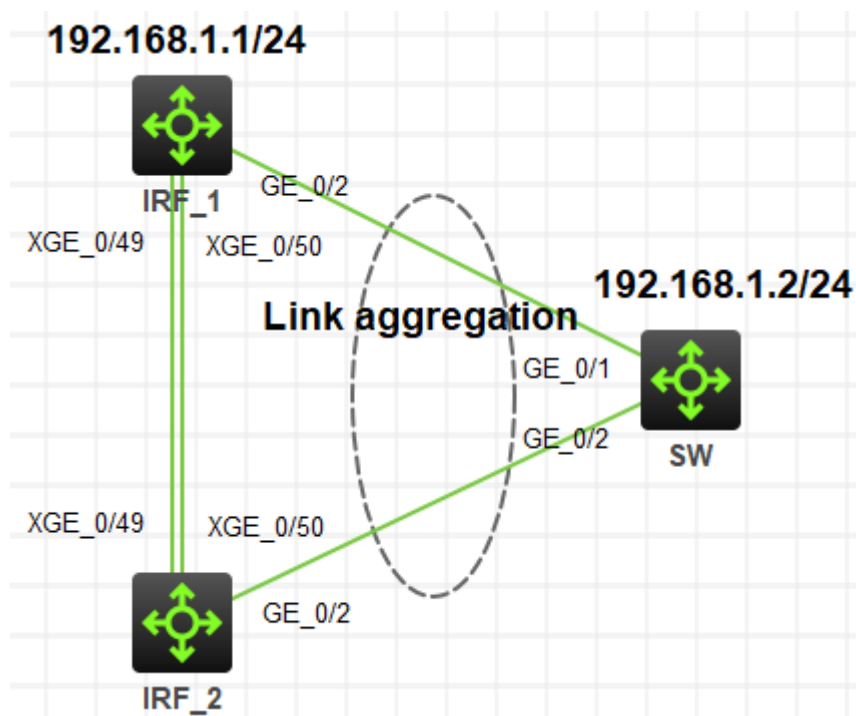


図 1.3 実習ネットワーク

手順 1: IRF 装置側に link aggregation の設定をします

```
[IRF]interface Bridge-Aggregation 1
[IRF-Bridge-Aggregation1]quit
[IRF]interface GigabitEthernet 1/0/2
[IRF-GigabitEthernet1/0/2]port link-aggregation group 1
%Nov 23 18:15:23:685 2021 IRF IFNET/3/IF_WARN: -Slot=1; The jumboframe of the
aggregate interface Bridge-Aggregation1 is not supported on the member port
GigabitEthernet1/0/2
[IRF-GigabitEthernet1/0/2]quit
[IRF]interface GigabitEthernet 2/0/2
[IRF-GigabitEthernet2/0/2]port link-aggregation group 1
%Nov 23 18:15:41:339 2021 IRF IFNET/3/IF_WARN: The jumboframe of the aggregate
interface Bridge-Aggregation1 is not supported on the member port GigabitEthernet2/0/2
[IRF-GigabitEthernet2/0/2]quit
[IRF]save f
Validating file. Please wait...
Saved the current configuration to mainboard device successfully.
Slot 1:
Save next configuration file successfully.
```

手順 2: link aggregation の設定を確認します

```
[IRF]dis link-aggregation member-port  
Flags: A -- LACP_Activity, B -- LACP_Timeout, C -- Aggregation,  
       D -- Synchronization, E -- Collecting, F -- Distributing,  
       G -- Defaulted, H -- Expired
```

GigabitEthernet1/0/2:

Aggregate Interface: Bridge-Aggregation1

```
Port Number: 3  
Port Priority: 32768  
Oper-Key: 1
```

GigabitEthernet2/0/2:

Aggregate Interface: Bridge-Aggregation1

```
Port Number: 131  
Port Priority: 32768  
Oper-Key: 1
```

手順 2: 外部 SW 側に link aggregation の設定をします

```
[SW]interface Bridge-Aggregation 1  
[SW]interface GigabitEthernet 1/0/1  
[SW-GigabitEthernet1/0/1]port link-aggregation group 1  
%Nov 23 19:09:48:044 2021 SW IFNET/3/IF_WARN: The jumboframe of the aggregate  
interface Bridge-Aggregation1 is not supported on the member port GigabitEthernet1/0/1  
[SW-GigabitEthernet1/0/1]quit  
[SW]interface GigabitEthernet 1/0/2  
[SW-GigabitEthernet1/0/2]port link-aggregation group 1  
[SW-GigabitEthernet1/0/2]quit  
%Nov 23 19:09:55:976 2021 SW IFNET/3/IF_WARN: The jumboframe of the aggregate  
interface Bridge-Aggregation1 is not supported on the member port GigabitEthernet1/0/2  
[SW]save f  
Validating file. Please wait...  
Saved the current configuration to mainboard device successfully.
```

手順 3: IRF 装置と SW 間のケーブルを接続して管理用の IP を

SW に設定し、IRF 装置との接続を ping で確認します。

注意: HCL では IRF の設定をされた SW が反応しなくなることがあります。その場合は一旦 IRF_1 または IRF_2 のスイッチを stop させ、再度 start させます。

```
[SW]int vlan 1
[SW-Vlan-interface1]ip address 192.168.1.2 24
[SW-Vlan-interface1]quit
[SW]ping 192.168.1.1
Ping 192.168.1.1 (192.168.1.1): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.1.1: icmp_seq=0 ttl=255 time=3.000 ms
56 bytes from 192.168.1.1: icmp_seq=1 ttl=255 time=1.000 ms
56 bytes from 192.168.1.1: icmp_seq=2 ttl=255 time=1.000 ms
56 bytes from 192.168.1.1: icmp_seq=3 ttl=255 time=0.000 ms
56 bytes from 192.168.1.1: icmp_seq=4 ttl=255 time=0.000 ms
```

手順 4: IRF 機能確認用の PC を設定

図 1.4 のように PCA と PCB の設定をしてからそれぞれの PC からのケーブルを接続します。

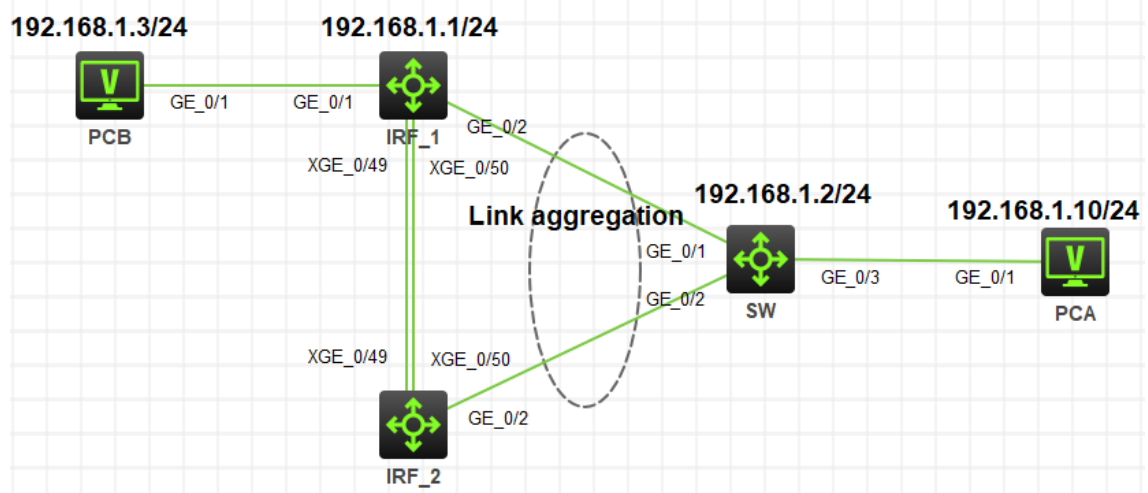


図 1.4 実習ネットワーク

手順 5: IRF の障害再現

SW から PCB へ連続して ping を実行。

```
[SW]ping -c 10000 192.168.1.3
```

```
Ping 192.168.1.3 (192.168.1.3): 56 data bytes, press CTRL_C to break
```

```

56 bytes from 192.168.1.3: icmp_seq=0 ttl=255 time=3.000 ms
56 bytes from 192.168.1.3: icmp_seq=1 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=2 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=3 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=4 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=5 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=6 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=7 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=8 ttl=255 time=1.000 ms
# IRF インターフェース Ten-GigabitEthernet1/0/49 を shutdown する
[IRF]interface Ten-GigabitEthernet 1/0/49
[IRF-Ten-GigabitEthernet1/0/49]shutdown
[IRF-Ten-GigabitEthernet1/0/49]quit
%Nov 23 12:49:11:460 2021 IRF LLDP/6/LLDP_DELETE_NEIGHBOR: Nearest bridge
agent neighbor deleted on port Ten-GigabitEthernet2/0/49 (IfIndex 178), neighbor's chassis
ID is 4cf2-7c42-0200, port ID is Ten-GigabitEthernet1/0/49.
%Nov 23 12:49:11:464 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface
Ten-GigabitEthernet2/0/49 changed to down.
%Nov 23 12:49:11:465 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the
interface Ten-GigabitEthernet2/0/49 changed to down.
%Nov 23 12:49:11:466 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface
Ten-GigabitEthernet1/0/49 changed to down.
%Nov 23 12:49:11:466 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the
interface Ten-GigabitEthernet1/0/49 changed to down.
[IRF]display irf link
Member 1
  IRF Port  Interface                Status
  1         Ten-GigabitEthernet1/0/49        ADM
           Ten-GigabitEthernet1/0/50        UP
  2         disable                    --
Member 2
  IRF Port  Interface                Status
  1         disable                    --
  2         Ten-GigabitEthernet2/0/49        DOWN
           Ten-GigabitEthernet2/0/50        UP
# SW から PCB への ping にはパケットロスが見られなかった

```

56 bytes from 192.168.1.3: icmp_seq=1 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=2 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=3 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=4 ttl=255 time=1.000 ms
56 bytes from 192.168.1.3: icmp_seq=5 ttl=255 time=1.000 ms

手順 6: IRF の障害復旧再現

IRF インターフェース Ten-GigabitEthernet1/0/49 を undo shutdown する

```
[IRF]interface Ten-GigabitEthernet 1/0/49
```

```
[IRF-Ten-GigabitEthernet1/0/49]undo shutdown
```

```
[IRF-Ten-GigabitEthernet1/0/49]quit
```

```
%Nov 23 12:51:40:319 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface  
Ten-GigabitEthernet2/0/49 changed to up.
```

```
%Nov 23 12:51:40:319 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the  
interface Ten-GigabitEthernet2/0/49 changed to up.
```

```
%Nov 23 12:51:40:065 2021 IRF LLDP/6/LLDP_CREATE_NEIGHBOR: -Slot=1; Nearest  
bridge agent neighbor created on port Ten-GigabitEthernet1/0/49 (IfIndex 50), neighbor's  
chassis ID is 4cf2-7c42-0200, port ID is Ten-GigabitEthernet2/0/49.
```

```
%Nov 23 12:51:40:321 2021 IRF IFNET/3/PHY_UPDOWN: Physical state on the interface  
Ten-GigabitEthernet1/0/49 changed to up.
```

```
%Nov 23 12:51:40:321 2021 IRF IFNET/5/LINK_UPDOWN: Line protocol state on the  
interface Ten-GigabitEthernet1/0/49 changed to up.
```

```
%Nov 23 12:51:40:321 2021 IRF LLDP/6/LLDP_CREATE_NEIGHBOR: Nearest bridge  
agent neighbor created on port Ten-GigabitEthernet2/0/49 (IfIndex 178), neighbor's chassis  
ID is 4cf2-7c42-0200, port ID is Ten-GigabitEthernet1/0/49.
```

```
%Nov 23 12:52:04:067 2021 IRF SHELL/5/SHELL_LOGOUT: Console logged out from con1.
```

```
[IRF]display irf link
```

```
Member 1
```

IRF Port	Interface	Status
1	Ten-GigabitEthernet1/0/49	UP
	Ten-GigabitEthernet1/0/50	UP
2	disable	--

```
Member 2
```

IRF Port	Interface	Status
1	disable	--
2	Ten-GigabitEthernet2/0/49	UP

Ten-GigabitEthernet2/0/50

UP

SW から PCB への ping にはパケットロスが見られなかった

56 bytes from 192.168.1.3: icmp_seq=1 ttl=255 time=1.000 ms

56 bytes from 192.168.1.3: icmp_seq=2 ttl=255 time=1.000 ms

56 bytes from 192.168.1.3: icmp_seq=3 ttl=255 time=1.000 ms

56 bytes from 192.168.1.3: icmp_seq=4 ttl=255 time=1.000 ms

56 bytes from 192.168.1.3: icmp_seq=5 ttl=255 time=1.000 ms

タスク 3: IRF ケーブル全てに障害が発生した場合に備えて

このテストでは、2 台のスイッチ(IRF_1 と IRF_2)間の 2 本の IRF ケーブルに障害が発生した場合、active/active となって、同じ IP アドレスを持つ装置になってしまうことを防ぐために用意されている MAD という機能を設定します。

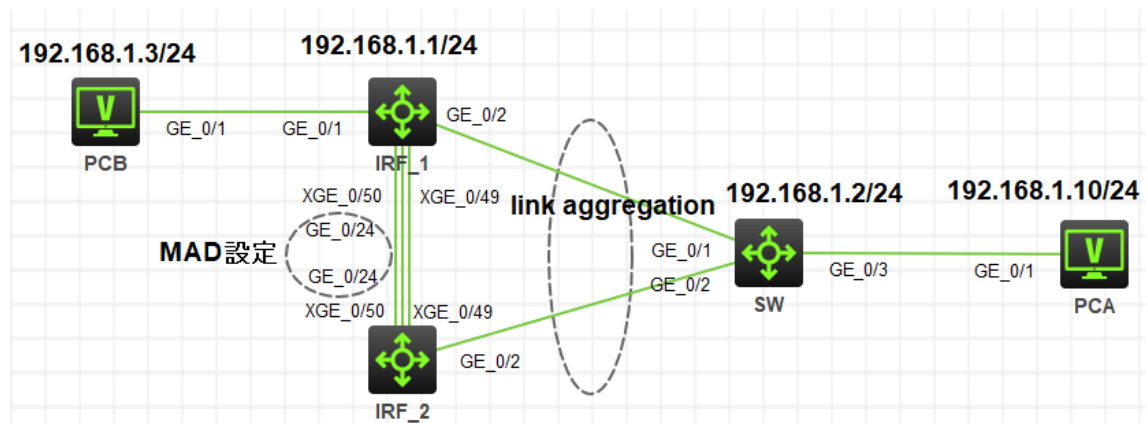


図 1.5 実習ネットワーク

手順 1: IRF 装置へ BFD MAD を設定します。

```
[IRF]vlan 99
```

```
[IRF-vlan99]quit
```

```
[IRF]interface vlan 99
```

```
[IRF-Vlan-interface99]mad bfd enable
```

```
[IRF-Vlan-interface99]mad ip address 172.16.0.1 24 member 1
```

```
[IRF-Vlan-interface99]mad ip address 172.16.0.2 24 member 2
```

```
[IRF-Vlan-interface99]quit
```

```
%Nov 23 21:04:48:548 2021 IRF BFD/4/BFD_MAD_INTERFACE_CHANGE_STATE: BFD
```

```
MAD function enabled on Vlan-interface99 changed to the faulty state.
```

```
[IRF]interface GigabitEthernet 1/0/24
```

```
[IRF-GigabitEthernet1/0/24]port access vlan 99
```

```
[IRF-GigabitEthernet1/0/24]undo stp enable
```



```

[IRF-GigabitEthernet1/0/24]quit
[IRF]interface GigabitEthernet 2/0/24
[IRF-GigabitEthernet2/0/24]port access vlan 99
[IRF-GigabitEthernet2/0/24]undo stp enable
[IRF-GigabitEthernet2/0/24]quit
[IRF]save f
Validating file. Please wait...
Saved the current configuration to mainboard device successfully.
Slot 1:
Save next configuration file successfully.

```

手順 2: BFD MAD に設定したポートにケーブルを接続します。

ケーブル接続が完了したら MAD の状態を確認します。

```

[IRF]display mad verbose
Multi-active recovery state: No
Excluded ports (user-configured):
Excluded ports (system-configured):
  Ten-GigabitEthernet1/0/49
  Ten-GigabitEthernet1/0/50
  Ten-GigabitEthernet2/0/49
  Ten-GigabitEthernet2/0/50
MAD ARP disabled.
MAD ND disabled.
MAD LACP disabled.
MAD BFD enabled interface: Vlan-interface99
MAD status          : Faulty
Member ID   MAD IP address   Neighbor   MAD status
  1         172.16.0.1/24      2         Faulty
  2         172.16.0.2/24      1         Faulty
[IRF]display bfd session
Total Session Num: 1      Up Session Num: 0      Init Mode: Active

IPv4 session working in control packet mode:

LD/RD          SourceAddr   DestAddr      State  Holdtime  Interface
129/0          172.16.0.1   172.16.0.2    Down   0ms       Vlan99

```

手順 3: IRF を構成するケーブルを shutdown して MAD の機能を 確認します。

IRF_1 のポートの状態は UP なので、こちらは 192.168.1.1 のアドレスでアクセスできます。

```
[IRF]display ip interface brief
```

```
*down: administratively down
```

```
(s): spoofing (l): loopback
```

Interface	Physical	Protocol	IP Address	Description
MGE0/0/0	down	down	--	--
Vlan1	up	up	192.168.1.1	--
Vlan99	down	down	172.16.0.1	--

IRF_2 のポートの状態は DOWN なので、こちらは 192.168.1.1 のアドレスでアクセスできません。

```
[IRF]display ip interface brief
```

```
*down: administratively down
```

```
(s): spoofing (l): loopback
```

Interface	Physical	Protocol	IP Address	Description
MGE0/0/0	down	down	--	--
Vlan1	down	down	192.168.1.1	--
Vlan99	down	down	172.16.0.2	--

それぞれのコンフィギュレーション

IRF のコンフィギュレーション

```
#
```

```
version 7.1.075, Alpha 7571
```

```
#
```

```
sysname IRF
```

```
#
```

```
irf mac-address persistent timer
```

```
irf auto-update enable
```

```
undo irf link-delay
```

```
irf member 1 priority 32
```

```
irf member 2 priority 1
```

```
#
```

```
lldp global enable
```

```
#
system-working-mode standard
xbar load-single
password-recovery enable
lpu-type f-series
#
vlan 1
#
Vlan 99
#
irf-port 1/1
  port group interface Ten-GigabitEthernet1/0/49
  port group interface Ten-GigabitEthernet1/0/50
#
irf-port 2/2
  port group interface Ten-GigabitEthernet2/0/49
  port group interface Ten-GigabitEthernet2/0/50
#
  stp global enable
#
interface Bridge-Aggregation1
#
interface NULL0
#
interface Vlan-interface1
  ip address 192.168.1.1 255.255.255.0
#
interface Vlan-interface99
  mad bfd enable
  mad ip address 172.16.0.1 255.255.255.0 member 1
  mad ip address 172.16.0.2 255.255.255.0 member 2
#
.....一部省略
#
interface GigabitEthernet1/0/1
  port link-mode bridge
```

```
    combo enable fiber
#
interface GigabitEthernet1/0/2
  port link-mode bridge
  combo enable fiber
port link-aggregation group 1
#
interface GigabitEthernet1/0/3
  port link-mode bridge
  combo enable fiber
#
.....一部省略
#
interface GigabitEthernet1/0/24
  port link-mode bridge
  port access vlan 99
  combo enable fiber
  undo stp enable
#
.....一部省略
#
interface GigabitEthernet2/0/1
  port link-mode bridge
  combo enable fiber
#
interface GigabitEthernet2/0/2
  port link-mode bridge
  combo enable fiber
port link-aggregation group 1
#
interface GigabitEthernet2/0/3
  port link-mode bridge
  combo enable fiber
#
.....一部省略
#
```

interface GigabitEthernet2/0/24

port link-mode bridge

port access vlan 99

combo enable fiber

undo stp enable

#

.....一部省略

#

interface Ten-GigabitEthernet1/0/51

port link-mode bridge

combo enable fiber

#

interface Ten-GigabitEthernet1/0/52

port link-mode bridge

combo enable fiber

#

interface Ten-GigabitEthernet2/0/51

port link-mode bridge

combo enable fiber

#

interface Ten-GigabitEthernet2/0/52

port link-mode bridge

combo enable fiber

#

interface Ten-GigabitEthernet1/0/49

combo enable fiber

#

interface Ten-GigabitEthernet1/0/50

combo enable fiber

#

interface Ten-GigabitEthernet2/0/49

combo enable fiber

#

interface Ten-GigabitEthernet2/0/50

combo enable fiber

#

```
scheduler logfile size 16
#
line class aux
  user-role network-operator
#
.....一部省略
#
return
```

SW のコンフィギュレーション

```
#
version 7.1.075, Alpha 7571
#
sysname SW
#
irf mac-address persistent timer
irf auto-update enable
undo irf link-delay
irf member 1 priority 1
#
lldp global enable
#
system-working-mode standard
xbar load-single
password-recovery enable
lpu-type f-series
#
vlan 1
#
stp global enable
#
interface Bridge-Aggregation1
#
interface NULL0
#
interface Vlan-interface1
```

```
ip address 192.168.1.2 255.255.255.0
#
...一部省略
#
interface GigabitEthernet1/0/1
  port link-mode bridge
  combo enable fiber
  port link-aggregation group 1
#
interface GigabitEthernet1/0/2
  port link-mode bridge
  combo enable fiber
  port link-aggregation group 1
#
interface GigabitEthernet1/0/3
  port link-mode bridge
  combo enable fiber
#
...一部省略
#
line class aux
  user-role network-operator
#
...一部省略
#
return
```

質問:

1. IRF を構成するポートは active/stand-by のようにいずれかのポートは正常の場合はデータが送受信されないでしょうか？

答え:

いいえ。IRF を構成するポートは load-sharing されていてそれぞれのポートがデータの送受信をしております。